



IFW

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: Wongsenakhum et al.

Attorney Docket No.:

NOVLP096/NVLS-002902

Application No.: 10/815,560

Examiner: UNKNOWN

Filed: March 31, 2004

Group: 1762

Title: METHODS FOR LOWERING  
RESISTIVITY OF TUNGSTEN FILM**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage as first-class mail on August 25, 2004 in an envelope addressed to the Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313-1450.

Signed: \_\_\_\_\_

Joyce L. Ferreira

**INFORMATION DISCLOSURE STATEMENT  
37 CFR §§1.56 AND 1.97(b)**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

The references listed in the attached PTO Form 1449 may be material to examination of the above-identified patent application. Applicants submit the list of these references in compliance with their duty of disclosure pursuant to 37 CFR §§1.56 and 1.97. The Examiner is requested to make these references of official record in this application.

This Information Disclosure Statement is not to be construed as a representation that a search has been made, that additional information material to the examination of this application does not exist, or that these references indeed constitute prior art.

This Information Disclosure Statement is: (i) filed within three (3) months of the filing date of the above-referenced application, (ii) believed to be filed before the mailing date of a first Office Action on the merits, or (iii) believed to be filed before the mailing of a first Office Action after the filing of a Request for Continued Examination under §1.114. Accordingly, it is believed that no fees are due in connection with the filing of this Information Disclosure Statement. However, if it is determined that any fees are due, the Commissioner is hereby authorized to charge such fees to Deposit Account 500388 (Order No. NOVLP096).

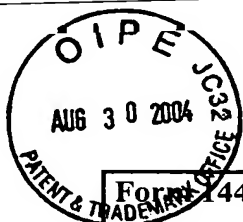
Respectfully submitted,

BEYER WEAVER &amp; THOMAS, LLP

  
Jeffrey K. Weaver

Registration No. 31,314

P.O. Box 778  
Berkeley, CA 94704-0778



Form 1449 (Modified)

**Information Disclosure  
Statement By Applicant**

(Use Several Sheets if Necessary)

Atty Docket No.

NOVLP096/NVLS-002902

Application No.:

10/815,560

Applicant:

Wongsenakhum et al.

Filing Date

March 31, 2004

Group

1762

**U.S. Patent Documents**

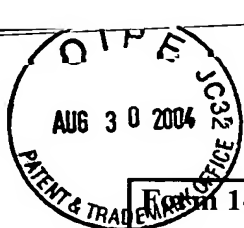
Examiner Initial	No.	Patent No.	Date	Patentee	Class	Sub-class	Filing Date
	A1	6,143,082	11/07/00	McInerney et al.			
	A2	5,795,824	08/18/98	Hancock			
	A3	4,804,560	2/89	Shioya et al.			
	A4	5,661,080	08/97	Hwang et al.			
	A5	5,726,096	3/98	Jung			
	A6	5,804,249	9/98	Sukharev et al.			
	A7	6,294,468	09/01	Gould-Choquette et al.			
	A8	5,391,394	02/95	Hansen			
	A9	6,245,654	06/01	Shih et al.			
	A10	6,297,152	10/01	Itoh et al.			
	A11	6,265,312	07/01	Sidhwa et al.			
	A12	5,956,609	09/99	Lee et al.			
	A13	6,309,966	10/01	Govindarajan et al.			
	A14	5,250,329	10/93	Miracky et al.			
	A15	6,066,366	5/00	Berenbaum et al.			
	A16	5,817,576	10/98	Tseng et al.			
	A17	5,326,723	07/94	Petro et al.			
	A18	5,028,565	07/91	Chang et al.			

**Foreign Patent or Published Foreign Patent Application**

Examiner Initial	No.	Document No.	Publication Date	Country or Patent Office	Class	Sub-class	Translation	
							Yes	No
	B1							

**Other Documents**

Examiner Initial	No.	Author, Title, Date, Place (e.g. Journal) of Publication
	C1	George et al., "Surface Chemistry for atomic Layer Growth", J. Phys. Chem, 1996, vol. 100, no, 31, pgs. 13121-13131.



<b>Form 1449 (Modified)</b>  <b>Information Disclosure Statement By Applicant</b>  (Use Several Sheets if Necessary)	Atty Docket No. NOVLP096/NVLS-002902	Application No.: 10/815,560
	Applicant: Wongsenakhum, et al. Filing Date March 31, 2004	Group 1762

	C2	Bell et al., "Batch Reactor Kinetic Studies of Tungsten LPCVD from Silane and Tungsten Hexafluoride", J. Electrochem. Soc., January 1996, Vol. 143, No. 1, pgs. 296-302.
	C3	Klaus et al., "Atomic layer deposition of tungsten using sequential surface chemistry with a sacrificial stripping reaction", Thin Solid Films 360 (2000) 145-153.
	C4	Klaus et al., "Atomically Controlled Growth of Tungsten and Tungsten Nitride Using Sequential Surface Reactions," Applied Surface Science, 162-163, (2000) 479-491.
	C5	Li et al., "Deposition of $W_Nx_Cy$ Thin Films by ALCVD <sup>TM</sup> Method for Diffusion Barriers in Metallization," IITC Conference Report, 2002, 3 Pages.
	C6	Elam et al, "Nucleation and Growth During Tungsten Atomic Layer Deposition on $SiO_2$ Surfaces," Thin Solid Films, 2001, 13 Pages.
	C7	Collins et al., "Pulsed Deposition of Ultra Thin Tungsten for Plugfill of High Aspect Ratio Contacts," Presentation made at Semicon Korea 2003, January 21, 2003, 9 pages.
	C8	Collins, et al., "Pulsed Deposition of Ultra Thin Tungsten for Plugfill of High Aspect Ratio Contacts," Semiconductor Equipment and Materials International, Semicon Korea, January 21, 2003, 3 pages.
	C9	Lee et al., "Pulsed Deposition of Ultra Thin Tungsten and its Application for Plugfill of High Aspect Ratio Contacts, Abstract, January 21, 2003, 1 page.
Examiner		Date Considered

Examiner: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.